What is claimed is:

1. A collection of amorphous particles comprising non-rare earth metal/metalloid host composition and a rare earth metal dopant/additive, the collection of particles having an average primary particle diameters less than about 500 nm.

2. The collection of amorphous particles of claim 1 wherein the primary particles have an average diameter less than about 250 nm.

3. The collection of amorphous particles of claim 1 wherein the primary particles have an average diameter less than about 100 nm.

4. The collection of amorphous particles of claim 1 wherein the particles comprise from about 0.01 mole percent to about 10 mole percent rare earth metal dopant/additive composition content relative to the total host composition and dopant/additive composition content.

5. The collection of amorphous particles of claim 1 wherein the particles comprise from about 0.025 mole percent to about 5 mole percent rare earth metal dopant/additive composition content relative to the total host composition and dopant/additive composition content.

6. The collection of amorphous particles of claim 1 wherein the particles comprise from about 0.1 mole percent to about 3 mole percent rare earth metal composition content relative to the total host composition and dopant/additive composition content.

7. The collection of amorphous particles of claim 1 wherein the metal/metalloid host composition comprises a host oxide selected from the group consisting of TiO_2, SiO_2, GeO_2, Al_2O_3, P_2O_5, B_2O_3, TeO_2 and combinations thereof, and wherein the particles comprise at least about 40 mole percent of the host oxide relative to the total host composition and dopant/additive composition content.

8. The collection of particle of claim 1 wherein the host oxide comprises SiO_2.

9. . The collection of amorphous particles of claim 7 further comprising a non-rare earth metal dopant/additive selected from the group consisting of Ga, Mg, Sr, Ti, Si, Ge, Al, P, B, Te, Bi, Sb, La, Y, Zr, Pb, Li, Na, K, Ba, Zn, W, Ca, and combinations thereof.

10. The collection of amorphous particles of claim 9 wherein the particles comprise from about 0.05 mole percent to about 5 mole percent non-rare earth metal dopant/additive composition content relative to the total host composition and dopant/additive composition content.

11. The collection of amorphous particles of claim 1 wherein the rare earth metal dopant/ additive is selected from the group consisting of Ho, Eu, Ce, Tb, Dy, Er, Yb, Nd, La, Y, Pr, Tm and combinations thereof.

12. The collection of amorphous particles of claim 1 wherein effectively no primary particles have a diameter greater than about 5 times the average diameter of the primary particles.

13. The collection of amorphous particles of claim 1 wherein effectively no primary particles have a diameter greater than about 3 times the average diameter of the primary particles.

14. The collection of amorphous particles of claim 1 wherein the primary particles have a distribution of particle diameters wherein at least about 95 percent of the primary particles have a

diameter greater than about 45 percent of the average diameter of the primary particles and less than about 200 percent of the average diameter.

15. The collection of amorphous particles of claim 1 wherein the particles comprise at least five different metal/metalloid elements.

16. A collection of amorphous particles comprising a metalloid oxide selected from the group consisting of B_2O_3 and TeO_2, and a metal/metalloid dopant/additive, the collection of particles having an average diameter no more than about 1000 nm, wherein the particles comprise at least about 51 mole percent metalloid oxide content relative to the total metalloid oxide and dopant/additive composition content of the particles.

17. The collection of amorphous particles of claim 16 wherein effectively no primary particles have a diameter greater than about 5 times the average diameter.

18. The collection of amorphous particles of claim 16 wherein the primary particles comprise a distribution of particle diameters wherein at least about 95 percent of the primary particles have a diameter greater than about 45 percent of the average diameter and less than about 200 percent of the average diameter.

19. A collection of particles comprising a metalloid oxide selected from the group consisting of B_2O_3 and TeO_2, the collection of particles having an average diameter no more than about 250 nm.

20. The collection of particles of claim 19 wherein the particles further comprise a metal/metalloid dopant/additive.

21. The collection of particles of claim 20 wherein the particles comprise at least about 51 mole percent metalloid oxide content relative to the total metalloid oxide and dopant/additive composition content of the particles.

22. The collection of particles of claim 20 wherein the metal/metalloid dopant/additive comprises a rare earth metal.

23. The collection of particles of claim 20 wherein the metal/metalloid dopant/additive comprises a non-rare earth metal.

24. The collection of particles of claim 19 having an average diameter no more than about 150 nm.

25. The collection of particles of claim 19 having an average diameter from about 3 nm to about 100 nm.

26. The collection of particles of claim 19 wherein the metalloid oxide comprises B_2O_3.

27. The collection of particles of claim 19 wherein the metalloid oxide comprises TeO_2.

28. The collection of particles of claim 19 wherein effectively no primary particles have a diameter greater than about 5 times the average diameter.

29. The collection of particles of claim 19 wherein the primary particles comprise a distribution of particle diameters wherein at least about 95 percent of the primary particles have a diameter greater than about 45 percent of the average diameter and less than about 200 percent of the average diameter.

30. A collection of amorphous particles comprising GeO_2 and a metal/metalloid dopant/additive, the collection of particles having an average diameter no more than about 500 nm.

31. The collection of amorphous particles of claim 30 wherein the collection of particles comprises at least about 30 weight percent GeO_2.

32. The collection of amorphous particles of claim 30 wherein the collection of particles comprises at least about 51 weight percent GeO_2.

33. The collection of amorphous particles of claim 30 wherein effectively no primary particles have a diameter greater than about 5 times the average diameter.

34. The collection of amorphous particles of claim 30 wherein the primary particles comprise a distribution of particle diameters wherein at least about 95 percent of the primary particles have a diameter greater than about 45 percent of the average diameter and less than about 200 percent of the average diameter.

35. A collection of particles comprising a composition selected from the group consisting of $LiNbO_3$ and $LiTaO_3$, the collection of particles having an average diameter no more than about 500 nm.

36. The collection of particles of claim 35 wherein effectively no primary particles have a diameter greater than about 5 times the average diameter.

37. The collection of particles of claim 35 wherein the primary particles comprise a distribution of particle diameters wherein at least about 95 percent of the primary particles have a diameter greater than about 45 percent of the average diameter and less than about 200 percent of the average diameter.

38. A collection of particles comprising a metal/metalloid composition selected from the group consisting of a metal/metalloid arsinide, a metal/metalloid calcinate, a metal/metalloid telluride, a metal/metalloid phosphide and a metal/metalloid selenide, the collection of particles having an average diameter from about 3 nm to about 500 nm.

39. The collection of particles of claim 38 wherein the collection of particles comprises amorphous particles.

40. The collection of particles of claim 38 wherein the collection of particles comprises crystalline particles.

41. The collection of particles of claim 38 wherein the primary particles have an average diameter no more than about 100 nm.

42. The collection of particles of claim 38 wherein effectively no primary particles have a diameter greater than about 5 times the average diameter.

43. The collection of particles of claim 38 wherein the primary particles comprise a distribution of particle diameters wherein at least about 95 percent of the primary particles have a diameter greater than about 45 percent of the average diameter and less than about 200 percent of the average diameter.

44. A collection of particles comprising a first metal/metalloid, a transition metal different from the first metal/metalloid and a fluorine dopant/additive thereof, the collection of particles having an average primary particle diameter of no more than about 500 nm.

45. The collection of particles of claim 44 wherein effectively no primary particles have a diameter greater than about 5 times the average diameter.

46. The collection of particles of claim 44 wherein the primary particles comprise a distribution of particle diameters wherein at least about 95 percent of the primary particles have a diameter greater than about 45 percent of the average diameter and less than about 200 percent of the average diameter.

47. A collection of particles comprising a glass forming host composition, a first dopant/ additive that introduces an absorption at a first wavelength of the electromagnetic spectrum and an emission at a second wavelength larger than the first wavelength and a second dopant/additive that creates a lasting change in index-of-refraction of the particles as a result of exposure to a third wavelength of electromagnetic radiation, the particles having an average primary particle diameter of no more than about 500 nm.

48. The collection of particles of claim 47 wherein the first dopant/additive comprises a rare earth metal.

49. The collection of particles of claim 47 wherein the second dopant/additive comprises Ge.

50. The collection of particles of claim 47 wherein effectively no primary particles have a diameter greater than about 5 times the average diameter.

51. The collection of particles of claim 47 wherein the primary particles comprise a distribution of particle diameters wherein at least about 95 percent of the primary particles have a

diameter greater than about 45 percent of the average diameter and less than about 200 percent of the average diameter.

52. A collection of particles comprising a glass forming host composition, a first dopant/additive that introduces an absorption at a first wavelength of the electromagnetic spectrum and an emission at a second wavelength larger than the first wavelength, and a second dopant/additive that introduces paramagnetism to the particles.

53. The collection of particles of claim 52 wherein the second dopant/additive comprises Ce or Tb.

54. The collection of particles of claim 52 wherein effectively no primary particles have a diameter greater than about 5 times the average diameter.

55. The collection of particles of claim 52 wherein the primary particles comprise a distribution of particle diameters wherein at least about 95 percent of the primary particles have a diameter greater than about 45 percent of the average diameter and less than about 200 percent of the average diameter.

56. A collection of particles comprising an oxide composition, the oxide composition comprising silicon, an alkali metal or alkali earth metal and a third metal/metalloid element, the collection of particles having an average particle diameter less than about 500 nm.

57. The collection of particle of claim 56 wherein the alkali metal or alkali earth metal comprises sodium or calcium.

58. The collection of particle of claim 56 wherein the third metal/metalloid element comprises aluminum.

59. The collection of particles of claim 56 wherein effectively no primary particles have a diameter greater than about 5 times the average diameter.

60. The collection of particles of claim 56 wherein the primary particles comprise a distribution of particle diameters wherein at least about 95 percent of the primary particles have a diameter greater than about 45 percent of the average diameter and less than about 200 percent of the average diameter.

61. A preform comprising a powder array having an average primary particle dimaeter of no more than about 500 nm, the powder array comprising a composition selected from the group consisting of a non-rare earth metal/metalloid host composition and a rare earth metal dopant/additive; B_2O_3; TeO_2; GeO_2 and a metal/metalloid dopant/additive; $LiNbO_3$; $LiTaO_3$; a metal/metalloid arsinide; a metal/metalloid telluride; a metal/metalloid calcinate; a metal/metalloid phosphide; a metal/metalloid selenide; a first metal/metalloid, a transition metal different from the first metal/metalloid and a fluorine, chlorine, carbon or nitrogen dopant/additive; a host composition, a first dopant/additive that introduces an absorption at a first wavelength of the electromagnetic spectrum and an emission at a second wavelength higher than

the first wavelength and a dopant/additive that creates a lasting change in index-of-refraction of the particles as a result of exposure to a third wavelength; an oxide composition comprising silicon, an alkali metal or alkali earth metal and a third metal/metalloid element; and a host composition, a first dopant/additive that introduces an absorption at a first wavelength of the electromagnetic spectrum and an emission at a second wavelength larger than the first wavelength and a second dopant/additive that introduces paramagnetism to the particles.

62. The preform of claim 61 wherein effectively no primary particles have a diameter greater than about 5 times the average diameter.

63. The preform of claim 61 wherein the primary particles have a distribution of particle diameters with at least about 95 percent of the primary particles have a diameter greater than about 45 percent of the average diameter and less than about 200 percent of the average diameter.

64. The preform of claim 61 wherein the powder array has an average primary particle diameter of no more than about 250 nm.

65. The preform of claim 61 wherein the powder array has an average primary particle diameter of no more than about 100 nm.

66. The preform of claim 61 wherein the powder array comprises a network of channels formed from fused primary particles.

67. A method for producing product particles comprising a composition selected from the group consisting of an amorphous non-rare earth metal/metalloid host composition and a rare earth metal dopant/additive; B_2O_3; TeO_2; GeO_2 and a metal/metalloid dopant/additive; $LiNbO_3$; $LiTaO_3$; a metal/metalloid arsinide; a metal/metalloid telluride; a metal/metalloid calcinate; a metal/metalloid phosphide; a metal/metalloid selenide; a first metal/metalloid, a transition metal different from the first metal/metalloid and a fluorine, chlorine, carbon or nitrogen dopant/additive; a glass forming host composition, a first dopant/additive that introduces an absorption at a first wavelength of the electromagnetic spectrum and an emission at a second wavelength higher than the first wavelength and a dopant/additive that creates a lasting change in index-of-refraction of the particles as a result of exposure to a third wavelength; oxide composition comprising silicon, an alkali metal or alkali earth metal and a third metal/metalloid element; and a glass forming host composition, a first dopant/ additive that introduces an absorption at a first wavelength of the electromagnetic spectrum and an emission at a second wavelength larger than the first wavelength and a second dopant/additive that introduces paramagnetism to the particles, the method comprising reacting a reactant stream within a reaction chamber, the reactant stream comprising selected precursors to produce the desired composition, the reaction driven by a radiation source and under conditions that result in particles with the selected composition.

68. The method of claim 67 wherein the reactant stream comprises an aerosol.

69. The method of claim 68 wherein the reactant stream further comprises a vapor metal/metalloid precursor.

70. The method of claim 67 wherein the reactant stream comprises exclusively vapor precursors.

71. The method of claim 67 wherein the reactant stream comprises a vapor silicon precursor and an aerosol comprising a rare earth precursor.

72. The method of claim 67 wherein the product particles have an average primary particle diameter of no more than about 500 nm.

73. The method of claim 72 wherein effectively no primary particles have a diameter greater than about 5 times the average diameter.

74. The method of claim 72 wherein the primary particles comprise a distribution of particle diameters wherein at least about 95 percent of the primary particles have a diameter greater than about 45 percent of the average diameter and less than about 200 percent of the average diameter.

75. The method of claim 67 further comprising collecting the particles in a collector.

76. The method of claim 67 further comprising coating the particles onto a substrate surface.

77. The method of claim 67 wherein the particle are produced at a rate of at least about 25 grams per hour.

78. A method for forming a preform comprising a powder array, the powder array comprising a composition selected from the group consisting of a non-rare earth metal/metalloid host composition and a rare earth metal dopant/additive; B_2O_3; TeO_2; GeO_2 and a metal/metalloid dopant/additive; $LiNbO_3$; $LiTaO_3$; a metal/metalloid arsinide; a metal/metalloid telluride; a metal/metalloid calcinate; a metal/metalloid phosphide; a metal/metalloid selenide; a first metal/metalloid, a transition metal different from the first metal/metalloid and a fluorine, chlorine, carbon or nitrogen dopant/additive; a host composition, a first dopant/additive that introduces an absorption at a first wavelength of the electromagnetic spectrum and an emission at a second wavelength higherthan the first wavelength and a dopant/additive that creates a lasting change in index-of-refraction of the particles as a result of exposure to a third wavelength; oxide composition comprising silicon, an alkali metal or alkali earth metal and a third metal/metalloid element; and a host composition, a first dopant/additive that introduces an absorption at a first wavelength of the electromagnetic spectrum and an emission at a second wavelength larger than the first wavelength and a second dopant/additive that introduces paramagnetism to the particles, the method comprising:

reacting a reactant stream within a reaction chamber, the reactant stream comprising selected precursors to produce the desired composition, the reaction driven by a radiation source; and

coating product particles onto at least a portion of a substrate surface from a product stream.

79. The method of claim 78 wherein at least about 10 gram per hour of particles are deposited onto the substrate surface.

80. A method for producing product particles comprising a composition selected from the group consisting of an amorphous non-rare earth metal/metalloid host composition and a rare earth metal dopant/additive; B_2O_3; TeO_2; GeO_2 and a metal/metalloid dopant/additive; $LiNbO_3$; $LiTaO_3$; a metal/metalloid arsinide; a metal/metalloid telluride; a metal/metalloid calcinate; a metal/metalloid phosphide; a metal/metalloid selenide; a first metal/metalloid, a transition metal different from the first metal/metalloid and a fluorine, chlorine, carbon or nitrogen dopant/additive; a glass forming host composition, a first dopant/additive that introduces an absorption at a first wavelength of the electromagnetic spectrum and an emission at a second wavelength higher than the first wavelength and a dopant/additive that creates a lasting change in index-of-refraction of the particles as a result of exposure to third wavelength; oxide composition comprising silicon, an alkali metal or alkali earth metal and a third metal/metalloid element; and a glass forming host composition, a first dopant/additive that introduces an absorption at a first wavelength of the electromagnetic spectrum and an emission at a second wavelength larger than the first wavelength and a second dopant/additive that introduces paramagnetism to the particles, the method comprising reacting reactants to produce product particles at a rate of at least about 25 grams per hour.

81. The method of claim 80 wherein the product particles are produced at a rate of at least about 100 grams per hour.

82. A method for forming a preform comprising a powder array, the powder array formed from a plurality of product particles, each of the product particles independently selected from a composition selected from the group consisting of an amorphous non-rare earth metal/metalloid host composition and a rare earth metal dopant/additive; B_2O_3; TeO_2; GeO_2 and a metal/metalloid dopant/additive; $LiNbO_3$; $LiTaO_3$; a metal/metalloid arsinide; a metal/metalloid telluride; a metal/metalloid calcinate; a metal/metalloid phosphide; a metal/metalloid selenide; a first metal/metalloid, a transition metal different from the first metal/metalloid and a fluorine, chlorine, nitrogen, carbon dopant/additive; a glass forming host composition, a first dopant/additive that introduces an absorption at a first wavelength of the electromagnetic spectrum and an emission at a second wavelength higher than the first wavelength and a dopant/additive that creates a lasting change in index-of-refraction of the particles as a result of exposure to a third wavelength; oxide composition comprising silicon, an alkali metal or alkali earth metal and a third metal/metalloid element; and a glass forming host composition, a first dopant/additive that introduces an absorption at a first wavelength of the electromagnetic spectrum and an emission at a second wavelength larger than the first wavelength and a second dopant/additive that introduces paramagnetism to the particles, the method, the method comprising coating particles onto a substrate surface at a rate of at least about 10 grams per hour.

83. The method of claim 82 further comprising reacting reactants to produce the particles.

84. The method of claim 82 wherein the substrate surface is moved relative to a flow of the particle to deposit the particles across the substrate surface.

85. The method of claim 82 wherein the substrate surface is stationary relative to a flow of the particles to deposit the particles over the portion of the surface contacted by the particle flow.

86. The method of claim 82 wherein substantially the entire substrate surface is coated to a thickness of about 10 microns in no more than about 25 seconds.

87. The method of claim 82 wherein substantially the entire substrate surface is coated to a thickness of about 10 microns in no more than about 10 seconds.

88. A method for producing a doped glass layer, the method comprising:

applying a solution to a powder array, the solution comprising a first metal/metalloid composition comprising at least one metal/metalloid element and a solvent in which the first metal/metalloid composition is soluble and the powder array comprising a second metal/metalloid composition that is effectively insoluble in the solvent and the powder array having an average primary particle diameter of no more than about 500 nm; and

heating the powder array with the applied solution above the flow temperature of the powder array to produce a substantially consolidated material comprising the second metal/metalloid composition combined with the at least one metal/metalloid element.

89. The method of claim 88 wherein the first metal/metalloid compound comprises at least two metal/metalloid elements and wherein following heating the powder array the substantially consolidated material comprises the second metal/metalloid composition combined with the at least two metal/metalloid element.

90. The method of claim 88 wherein the at least one metal/metalloid element comprises a rare earth metal or a metal/metalloid that enhances fluorescence or enhances paramagnetism.

91. The method of claim 88 further comprising:

reacting a reactant stream within a reaction chamber, the reactant stream comprising a metal/metalloid precursor for the first metal/metalloid composition, the reaction driven by a radiation source and under conditions that result in formation of product particles; and

depositing at least a portion of the product particles onto a substrate to form the powder array.

92. The method of claim 91 wherein the reactant stream further comprises a rare earth metal precursor or a Gd precursor.

93. The method of claim 91 wherein the reactant stream is formed from at least one reactant nozzle.

94. The method of claim 93 wherein the solution is applied through the reactant nozzle.

95. The method of claim 91 wherein the applying of the solution comprises dipping the powder array in the solution.

96. A method for producing a product composition comprising a plurality of metal/metalloid elements, the method comprising:

generating a flowing reactant stream with a nozzle connected to an aerosol generator that is configured to deliver an aerosol comprising one or more metal/metalloid elements and to a vapor/gas source that is configured to deliver a vapor/gas comprising one or more metal/metalloid elements; and

reacting the flowing reactant stream to produce the product composition.

97. The method of claim 96 wherein the reacting the flowing reactant stream comprises driving a reaction with a radiation beam intersecting the reactant flow.

98. The method of claim 96 wherein the aerosol generator is configured to deliver an aerosol to a first channel and the vapor/gas source is configured to deliver the vapor/gas to a second channel in which the aerosol and the vapor/gas mix following delivery.

99. The method of claim 98 wherein the reacting the flowing reactant stream comprises driving a reaction with a radiation beam intersecting the reactant flow and wherein the aerosol and vapor mix prior to intersecting the radiation beam.

100. The method of claim 98 wherein the reacting the flowing reactant stream comprises driving a reaction with a radiation beam intersecting the reactant flow and wherein the aerosol and vapor mix at an intersection with the radiation beam.

101. The method of claim 98 wherein the reacting the flowing reactant stream comprises driving a reaction with a radiation beam intersecting the reactant flow and wherein the aerosol and vapor mix following the intersection of the vapor/gas with the radiation beam.

102. The method of claim 96 wherein the metal/metalloid from the vapor/gas source is different from the metal/metalloid from the aerosol generator.

103. The method of claim 96 wherein the product composition comprises a composition selected from the group consisting of an amorphous non-rare earth metal/metalloid host composition and a rare earth metal dopant/additive; B_2O_3; TeO_2; GeO_2 and a metal/metalloid dopant/additive; $LiNbO_3$; $LiTaO_3$; a metal/metalloid arsinide; a metal/metalloid telluride; a metal/metalloid calcinate; a metal/metalloid phosphide; a metal/metalloid selenide; a first metal/metalloid, a transition metal different from the first metal/metalloid and a fluorine, chlorine, carbon or nitrogen dopant/additive; a glass forming host composition, a first dopant/additive that introduces an absorption at a first wavelength of the electromagnetic spectrum and an emission at a second wavelength higher than the first wavelength and a dopant/additive that creates a lasting change in index-of-refraction of the particles as a result of exposure to a third wavelength; oxide composition comprising silicon, an alkali metal or alkali earth metal and a third metal/metalloid element; and a glass forming host composition, a first

dopant/additive that introduces an absorption at a first wavelength of the electromagnetic spectrum and an emission at a second wavelength larger than the first wavelength and a second dopant/additive that introduces paramagnetism to the particles.

104. The method of claim 96 wherein the gas/vapor comprises Si, Li, K, Mg, Ba, Sr, Zn, Ge, Al, P, Te, Bi or combinations thereof.

105. The method of claim 96 wherein the aerosol comprises a rare earth metal, aluminum or gadolinium.

106. A method for the production of product particles, the method comprising:

generating an aerosol comprising a liquid within a reactant delivery system;

evaporating the liquid to form reactant particles that are delivered through a reactant delivery nozzle into a reaction chamber as at least a portion of a reactant stream; and

reacting the reactant stream to form product particles.

107. The method of claim 106 wherein the reacting the reactant stream comprises irradiating the reactant stream with a radiation beam to drive a reaction forming the product particles.

108. A method for generating a coated substrate, the method comprising:

generating an aerosol comprising a liquid within a reactant delivery system;

evaporating the liquid to form reactant particles that are delivered through a delivery nozzle;

reacting the reactant particles to form product particles; and

depositing at least a portion of the product particles onto a substrate.

109. The method of claim 108 wherein the reactant particles comprises irradiating the reactant particles with a radiation beam.

110. A method for producing a coating, the method comprising:

forming a product flow by reacting a reactant stream within a reaction chamber wherein at least a portion of the reactant stream is initiated through a reactant nozzle;

depositing a coating by directing the product flow at a substrate surface to produce a coated surface; and

directing an unreacted stream onto the coated surface through the reactant nozzle.

111. The method of claim 110 wherein the unreacted stream comprises an aerosol.

112. The method of claim 111 further comprising heating the aerosol to at least partly remove the solvent.

113. The method of claim 112 wherein the heating is performed with a radiation beam.

114. A method for producing a composition in a reactant flow, the method comprising:

generating a flowing reactant stream with at least one reactant nozzle within a reaction chamber at a chamber pressure, the flow to the nozzle comprising

a reaction precursor and a pressurized fluid, wherein the chamber pressure is sufficiently low to permit the pressurized fluid to evaporate upon entry into the reaction chamber and wherein the pressurized fluid vaporizes upon entry into the reaction chamber; and

reacting the flowing reactant stream to produce the chemical composition.

115. The method of claim 114 wherein the pressurized fluid comprises supercritical carbon dioxide.

116. The method of claim 114 wherein the pressurized fluid comprises a liquefied gas.

117. The method of claim 114 wherein the pressurized fluid comprises a pressurized gas within a solution.

118. The method of claim 114 wherein the reacting the flowing reactant stream comprises driving the reaction with energy from a radiation beam that intersects that reactant stream.

119. A method for doping a composition, the method comprising:

contacting a solution comprising a metal/metalloid ion with a powder array comprising the composition; and

applying an electric field across a dimension of the powder array to stimulate migration of the metal/metalloid ions into the composition.

120. A method for forming a glass on a substrate surface with varying dopant/additive concentrations across the substrate surface, the method comprising:

generating a reactant flow comprising a host precursor and a dopant/additive precursor in an aerosol comprising a selectable composition;

reacting the reactant flow to form a product flow comprising a product composition;

coating the product compositions onto a surface by moving the substrate surface relative to the product flow;

selecting the composition of dopant/additive precursor in the reactant flow to deposit different product compositions at different locations along the substrate surface.

121. The method of claim 120 wherein the selecting the composition of the dopant/additive precursor comprises selecting a corresponding concentration of dopant/additive precursor.

122. The method of claim 120 wherein the selecting the composition of the dopant/additive precursor comprises replacing a first dopant/additive element with a second dopant/additive element.

123. The method of claim 80 wherein effectively no primary particles have a diameter greater than about 5 times the average diameter.

124. The method of claim 80 wherein primary particles comprise a distribution of particle diameters wherein at least about 95 percent of the primary particles have a diameter greater than about 45 percent of the average diameter and less than about 200 percent of the average diameter.

125. The method of claim 82 wherein effectively no primary particles have a diameter greater than about 5 times the average diameter.

126. The method of claim 82 wherein primary particles comprise a distribution of particle diameters wherein at least about 95 percent of the primary particles have a diameter greater than about 45 percent of the average diameter and less than about 200 percent of the average diameter.

127. An optical device comprising at least one layer of glass and an over-cladding over the at least one layer of glass wherein the over-cladding comprises glass comprising a fluorine dopant/additive.

128. A method of forming an optical device comprising applying a glass comprising a fluorine dopant/additive over at least one layer of glass.